11.2 Length Area Volume Dimension

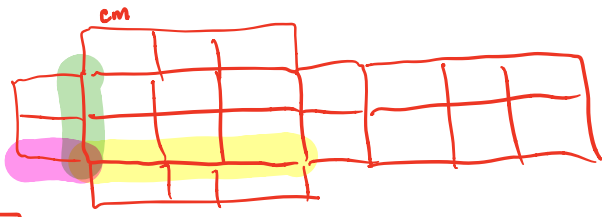
Practice Exercises for Section 11.2

1. **a.** Use centimeter or inch graph paper to make a pattern for a closed box (rectangular prism). The box should have 6 sides, and when you fold the pattern, there should be no overlapping pieces of paper.

   (for another eg. see fig 11.10 p508)

   b. How much paper is your box made of? Be sure to use an appropriate unit in your answer.

   c. Describe one-dimensional, two-dimensional, and three-dimensional parts or aspects of your box. In each case, give the size of the part or aspect of the box, using an appropriate unit.



22 cm^2

3D: vol is 2cm × 3cm × 1cm = 6 cm^3

1D: L 3cm, W 2cm, H 1cm

2D: surface area 22 cm^2

2. Describe one-dimensional, two-dimensional, and three-dimensional parts or aspects of a water tower.

   (see p508 for other aspects)

   In each case, name an appropriate U.S. customary unit and an appropriate metric unit for measuring or describing the size of that part or aspect of the water tower. What are practical reasons for wanting to know the sizes of these parts or aspects of the water tower?

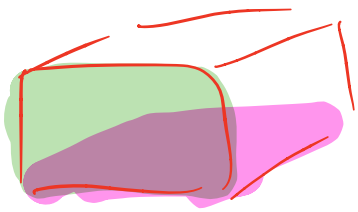
1D: Height. ~~30ft~~ feet (or yards) — meters

2D: surface area of tower $feet^2$ m^2

3D: volume of tower $feet^3$ (or gal) m^3 (or barrels) — Liters

Owner might want to know if they have enough wood (surface area) to make the tower, holds enough water (volume)

3. Describe one-dimensional, two-dimensional, and three-dimensional parts or aspects of a store. In each case, name an appropriate U.S. customary unit and an appropriate metric unit for measuring or describing the size of that part or aspect of the store. What are practical reasons for wanting to know the sizes of these parts or aspects of the store?



3D: volume (how much stuff will fit) (how much volume of air in store)
- ft^3
- m^3
- L

2D: floor space, area
- ft^2 - acres
- m^2

2D: storefront area

1D: depth, width, length, ceiling height etc.

PROBLEMS FOR SECTION 11.2

1. Describe one-dimensional, two-dimensional, and three-dimensional parts or aspects of a soft drink bottle. In each case, specify an appropriate U.S. customary unit and an appropriate metric unit for measuring or describing the size of that part or aspect of the bottle. What are practical reasons for wanting to know the sizes of these parts or aspects of the soft drink bottle?

1D
2D
3D – volume (how much drink can fit)
fl oz
mL

3. Drawing on your reading from this section, describe how it could happen that 3 different cathedrals could each claim—rightfully—to be the largest cathedral. Discuss the implications of this kind of situation for teaching students about measurement.

Possibilities
Largest height
Largest floorspace
Largest interior volume
Largest perimeter

NYC's St John the Divine

4. Describe one-dimensional, two-dimensional, and three-dimensional parts or aspects of the blocks in Figure 11.11. In each case, compare the sizes of the 3 blocks, using an appropriate unit. Use this unit to show that each block can be considered biggest of all 3.

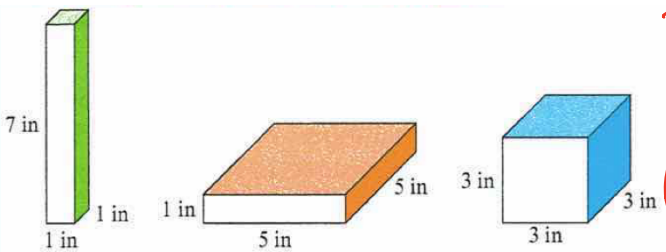


Figure 11.11 Which block is biggest?

1D Height — Block 1: 7 in (biggest) | Block 2: 1 in | Block 3: 3 in

2D footprint (area of base) — 1 in × 1 in = 1 in² | 5 in × 5 in = 25 in² (biggest) | 3 in × 3 in = 9 in²

(2D surface area)

3D volume — 7 in × 1 in × 1 in = 7 in³ | 1 in × 5 in × 5 in = 25 in³ | 3 in × 3 in × 3 in = 27 in³ (biggest)

7. Minh says that the rectangle on the left in Figure 11.12 is larger than the one on the right, Sequoia says the rectangle on the right is larger than the one on the left. Explain why Minh and Sequoia can both be right. Left rectangle is wider (5 > 3) but right rectangle is taller (8 > 5).

← 2 (of many) possible things one may mean when they say "biggest"

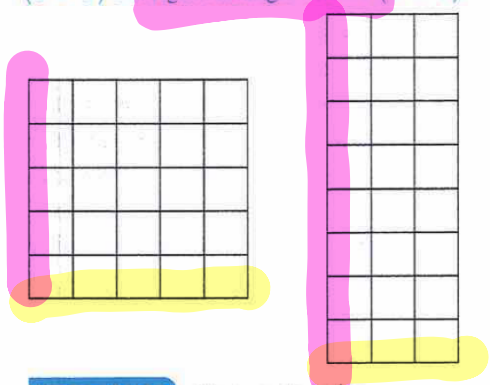


Figure 11.12 Two rectangles.